

MARKED-UP VERSION OF AMENDMENTS

IN THE CLAIMS:

Claims 12 and 21 have been canceled.

Claims 14-20 and 22-26 have been amended as follows:

14. **(Amended)** A plane light source unit according to claim ~~12~~ 13, wherein said linear light pipe is constituted by a rod-like member having at least six surfaces, namely, upper and lower surfaces, front and rear surfaces and left and right surfaces and further having an optical path changing means in said front surface to thereby make light incident from at least one point light source at either or both of the left and right surfaces exit from said light supply surface constituted by said rear surface.

15. **(Amended)** A plane light source unit according to claim ~~12~~ 13, wherein said linear light pipe is made of a rectangular parallelepiped having an optical path changing means in a counter surface opposite to said light supply surface of said linear light pipe, said optical path changing means having slopes inclined in the front-rear direction with respect to a reference plane of said light supply surface.

16. **(Amended)** A plane light source unit according to claim ~~12~~ 13, wherein said optical path changing means has slopes facing the

left or right surface and being inclined in the front-rear direction at an angle in a range of from 35 to 45 degrees with respect to a reference plane of said light supply surface.

17. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said light output means of said plane light pipe includes slopes facing said incidence side surface at an inclination angle in a range of from 35 to 45 degrees with respect to a reference plane of a light exit surface on a side opposite to said upper or lower surface having said light output means, and flat surfaces inclined at an inclination angle of not larger than 10 degrees so that the projected area of said flat surfaces on said reference plane is not smaller than 8 times as large as the projected area of said slopes on said reference plane.

18. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said light output means of said plane light pipe is constituted by a repetitive structure of prismatic structures each having a combination of a short side surface and a long side surface and disposed at intervals of a pitch of from 50 μm to 1.5 mm; each of said short side surfaces is made of a slope facing said incidence side surface at an inclination angle in a range of from 35 to 45 degrees with respect to a reference plane of a light exit surface on a side opposite to said upper or lower surface having said light output means; and each of said long side surfaces is

made of a slope inclined with respect to said reference plane so that the inclination angle is in a range of from 0 exclusively to 10 degrees, so that the inclination angle difference is not larger than 5 degrees and the inclination angle difference between adjacent ones of said long side surfaces is not larger than 1 degree on a whole surface of said plane light pipe, and so that the projected area of the long side surfaces on said reference plane is not smaller than 8 times as large as the projected area of the short side surfaces on said reference plane.

19. (Amended) A plane light source unit according to claim ~~16~~ 17, wherein the projected width of each of said slopes or short side surfaces of said light output means on said reference plane is not larger than 40 μm .

20. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said light output means of said plane light pipe is constituted by a repetitive structure of prismatic structures disposed at regular intervals of a pitch of from 50 μm to 1.5 mm.

22. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said plane light pipe has a refractive index of not higher than 1.54; said linear light pipe has a refractive index of not lower than 1.55; and said plane light pipe and said linear light pipe are connected and integrated with each other.

23. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said light output means of said plane light pipe has ridgelines inclined with an angle range of from -30 to +30 degrees with respect to said incidence side surface.

24. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said light output means of said plane light pipe has ridgelines inclined with an angle range of from -25 to +25 degrees with respect to said incidence side surface.

25. (Amended) A plane light source unit according to claim ~~12~~ 13, wherein said light output means of said plane light pipe has ridgelines inclined with an angle range of from -20 to +20 degrees with respect to said incidence side surface.

26. (Amended) A liquid-crystal display device comprising:
a plane light source unit according to claim ~~12~~ 13, and a liquid crystal cell.

REMARKS

By the present amendment, claims 12 and 21 have been canceled and claims 14-20 and 22-26 have been amended to correct dependencies, so that claims 14-18, 20 and 22-26 now depend on claim 13 instead of canceled claim 12 and claim 19 depends on claim 17 instead of claim 16.

Claims 1-11, 12-20 and 22-26 are pending in the present application. Claims 1-10, 13-20 and 22-25 are directed to a plane light source and claims 11 and 26 are directed to a liquid-crystal display device.

As a preliminary, in the Office Action, it is indicated that claim 13 is allowable. Accordingly, it is submitted that present claims 13-20 and 22-26 are immediately allowable.

Next, in the Office Action, claims 1-4, 9-12, 14-16 and 22-26 are rejected under 35 U.S.C. 103(a) as obvious over US 5835661 (Tai), and claims 5-8 and 17-20 are rejected under 35 U.S.C. 103(a) as obvious over Tai in view of US 5727107 (Umemoto).

These rejections are substantially similar to the rejections made in the previous Office Action. Further, in answer to the argument made in the response to the first Office Action that Tai is not concerned about large incidence angles, it is alleged in this Office Action that the beam collector of Tai is not necessarily a collimator, so that the effect of rays having large incidence angles must be considered by a person of the art.

In particular, the Office Action refers to the passage at col. 5, lines 30-35 of Tai which states:

“the beam collector 28 is shaped so that the beam collector 28 also collimates the divergent light in a predetermined manner. However, this need not necessarily be the case, since, for some applications, it may not be necessary for the beam collector 28 to collimate the light.”

It is alleged in the Office Action that this passage shows that Tai envisions applications where the light is not collimated at the interface between the linear and the plane light pipes.

The rejections are respectfully traversed. It is submitted that Tai never envisions uncollimated light at the interface between the linear and the plane light pipes, so that Tai does not provide a motivation to address a problem of light rays having a large incidence angle at this interface.

Specifically, it is submitted that the passage at col. 5, lines 30-35 of Tai cannot be isolated from the rest of the disclosure in Tai, as in the interpretation set forth in the Office Action, but must be understood in the context of the whole disclosure in Tai. Thus, when read in the context of the whole disclosure of Tai, this passage of Tai does not suggest that light is uncollimated at the interface between the light pipes of Tai.

In particular, the passage at col. 5, lines 10-15 of Tai (i.e., just above the passage referred to in the Office Action) states generally that:

“The light expanding system 10 includes a beam collector 28 and a beam expanding light pipe 14 to convert divergent light from a point-like source 2... into a linear light beam, the linear light beam being collimated in one or more dimensions.”

Further, the passage at col. 5, lines 46-48 (i.e., just after the passage referred to in the Office Action) explains that:

“The microprisms 44 [in the expanding light pipe 14] also collimate the light in a predetermined manner.”

Thus, when the passage at col. 5, lines 30-35 of Tai selected in the Office Action (which states that the expanding system does not necessarily collimate light) is read in conjunction with

these statements a few lines above (to the effect that the expanding system collimates the light), and a few lines below (to the effect that the microprisms in the expanding light pipe 14 collimate the light), it is clear that the reason why the beam collector 28 does not necessarily need to collimate light is because, in that case, the light is collimated in another location of the expanding system, for example in the expanding light pipe 14. Accordingly, a person of the art would not deduct from Tai that the light expanding system 10 does not collimate light, but only that the collimated light is obtained in various portions of the system 10.

Reference is also made to the passage at col. 7, lines 57-60 of Tai which states that:

“For certain types of light-emitting diodes including built-in lenses, the beam collector 28 need not have angled side surfaces, e.g., side surfaces 32 and 34, since the light from the light emitting diode is already adequately collimated.”

This passage confirms that a non-collimating beam collector 28 is provided in Tai only in cases where light is already collimated upon entry into the beam collector. Otherwise, Tai would not stress the importance of having an “already adequately collimated light” as a condition for eliminating the collimating angled side surfaces of the beam collector.

Further, the passage starting at col. 8, line 43 in reference to Fig. 3A, and in particular the passage at col. 8, lines 52-60 of Tai, also makes clear that Tai requires that light exiting the beam expanding light pipe 14 be narrowly collimated.

In summary, Tai provide teachings regarding various means to obtain collimated light, but no suggestion of an uncollimated light at the interface between the light pipes. Simultaneously, the passage at col. 13, lines 40-41 of Tai provides a clear and definite teaching that the refractive indices

of the successive light pipes should be the same or approximately the same, as discussed in the previous Office Action. Thus, Tai completely fails to (i) identify a problem of uncollimated light at the interface between light pipes and (ii) suggest or provide a motivation to address this problem by modifying the refractive indices.

In other words, a person of the art would have found no guidance in Tai as to whether modifying the refractive indices of the various optical elements would improve or deteriorate image quality. As a result, a person of the art would not have been motivated to modify Tai as alleged in the Office Action.

In contrast, in the presently claimed invention, a linear light pipe including a light supply surface and having a refractive index higher than that of said plane light pipe is provided, as recited in present claim 1. An advantage of this construction is that the relatively high refractive index of the linear light pipe makes it possible to increase reflectivity and output efficiency, and simultaneously, the relatively low refractive index of the planar light pipe makes it possible to widen the total reflection angle while also optimizing output efficiency and suppressing light leakage. These advantages are discussed in details and illustrated in particular on pages 24-25 of the present specification. This construction and its advantages are not taught or suggested in Tai or in any of the other cited references. Therefore, the present claims are not obvious over any combination of the cited references.

In view of the above, it is submitted that the rejections should be withdrawn.

In conclusion, the invention as presently claimed is patentable. It is believed that the claims are in allowable condition and a notice to that effect is earnestly requested.

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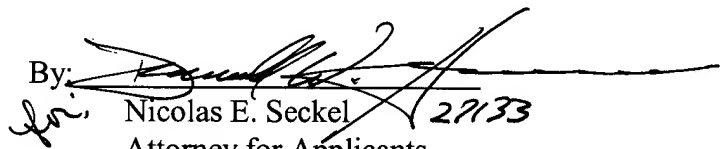
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In the event there is, in the Examiner's opinion, any outstanding issue and such issue may be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of the response period. Please charge the fee for such extension and any other fees which may be required to our Deposit Account No. 01-2340.

Respectfully submitted,

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